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Eagle Point/AutoCAD How-To for NRCS work

*Eagle Point Steps Using the NRCS/EP Customized Menu

Notation Method used in the instructions:
Button to Press *Displayed Text* **Icon** Action {Text to Enter} *Menu Item…*

Field Coding Format

The following is the format for entering Field Codes into a collector, definitions and examples:

(Field Code)(Line designator)(Line name)(Special designator)(<<space>>)(Description)

Definitions for Entering Field Codes Into a Collector

Field Code One of the user-defined codes defined in the Node (Field Code) Library in EaglePoint. 10 characters maximum.

Line designator This must be present if the point taken generates line work. Default value is a period (.). Some Field Codes have automatic linework which means that this linework designator & line name are not needed.

Line name Enter one of the pre-defined line names that are in the EaglePoint Line Work file. The line name will be connected to each occurrence in the job file that has the same line name.

Special designator(s)
Tells EaglePoint to make a curve, stop the line, close the line back to the beginning, etc.

<<space>> Required if a description is to be entered.

Description Used to describe the point taken. **Data Collection** places this description into the CAD graphic next to the point. This description overrides or is combined with the Node (Field Code) Library description.

NOTICE: The only time a space should be used is before entering the description or within a description.

EXAMPLE:

FC.FC- Property Line Fence

FC ----------	Field Code
. ----------	Line Designator
FC----------	Line Name
- ----------	Special Designator (Curve)
<<Space>>----------	Space
Property Line Fence ----------	Description

Field Entry Examples

The following examples use the default designators for line work:

Line Designators - System Defaults

Type Designator	Designator	SDR 33 Keys
Line	. (period)	.

Special Designators - System Defaults

Curve	- (hyphen)	Func T
Close line	+ (plus)	Func S
Join last shot	* (asterisk)	Func Y
Bearing close	# (pound sign)	Func 3
Cross-section	= (equal sign)	Func Enter
Stop line	! (exclamation point)	Func 1

Description Designators -System Defaults

Insert description	* (asterisk)	Func Y

Line Work Examples

FC.FC Property Line Places the node symbol FC and starts or connects to the linework named FC with a line(.), and overrides the default label for FC with “Property Line”.

FC.FC! Places the node symbol FC and ends the line named FC and uses the default description for Field Code “FC”.

DTREE This entry places symbol DTREE and uses the default description “Dtree”. No line work is produced.

FL Main Node Symbol = FL : “Main” is label
FL is auto linework used

FL.FL1 Node Symbol = FL : “FL” is label
FL auto linework &FL1 linework

FL.FL1! Node Symbol = FL : “FL” is label
FL1 linework ends,
FL auto linework continues

BLD.BLD1+ Node Symbol = BLD : “BLD” is label
BLD1 linework closes to the start of the “BLD1” linework

Here are some points to remember regarding Field Codes and symbols:

1. If you enter a Field Code for a shot and follow it with a description, Data Collection places the description you entered into the CAD graphic next to the symbol, i.e., CMP 36”Diam would use the label *36”Diam*. If you don’t enter a description, Data Collection uses the label it finds in the Node (Field Code) Library, i.e., CMP would use the label *CMP*.

2. If you don’t enter a Field Code for a point, Data Collection uses the default Field Code set in the Reduction Settings in Data Collection.

3. Data Collection assumes that anything alphanumeric less than 10 characters at the front of the description field is a Field Code. If it is not in the Node (Field Code) Library, Data Collection uses the default Field Code in the settings and displays the message “Field Code_ not found at point #” in the Warnings dialog box after the job is reduced.

The Iowa Field Code library default is M (Misc). A Field Code entry of Hole would use the node associated with Misc and give it a label *Hole*.

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Starting a New Eagle Point Project Using an NRCS Prototype

1. DoubleClick desktop **Eagle Point Icon** to start program.
2. Click **Create New Project Icon** located in lower left-hand corner.
3. Click *Eagle Point Project* and click Next.
4. Input a project name. E.g. {Bear Cr 33 Dam}
5. Press tab key on keyboard to get to next line
6. At project drawing line click on **folder icon**.
7. Browse to C:\My Projects\2001 directory to get ready to create a project subfolder. This 2001 folder will change as we advance into future years.
8. Click on **Create New folder icon** and rename this project folder. E.g. {Bear Cr 33}
9. Double click to open the *Bear Cr 33* **folder**.
10. Input a file name for the main drawing. E.g. {Bear Cr 33 Dam
11. Click Open - and you will be back at New Project box.
12. At the prototype setting use the pull down to select *NRCS 11x17* or *NRCS 22x34*.
13. The NRCS default prototype drawing that is in the C:\My Projects\Templates folder will show up as the template drawings. Or select a personalized Prototype drawing.
14. Click Finish and you will be back at Open screen.
15. Click to highlight your project.
    E.g. *C:\My Projects\2001\Bear Cr 33\Bear Cr 33 Dam.dwg*
16. Click OK and AutoCad will open the drawing. You will have 2 windows on your screen-a full screen of AutoCad and the smaller Eagle Point Main Menu.
17. To have output sent to a printer instead of a text file: At the EP Main Menu click on *File… Print setup….*
18. Click *Printer* rather than file. Click OK
19. Get the project ready to bring in survey: Click on EP Main Menu *Tools…Plot Scales…*
20. Input the horizontal scale to a scale that you might use to plot the survey points. This scale affects the size of the text as survey shots are put into the project. Example 1" = {50} feet, 1"= {100} feet. The vertical scale affects profile views that you create.
21. Click OK. **You can minimize the Eagle Point menu but you should NOT close out the EP main menu.**

Eagle Point Steps Using the NRCS/EP Customized Menu

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Downloading a Survey from a Data Collector

1. From AutoCAD Click *NRCS/EP… Survey Import… Download from Collector….*
2. Input a job name that describes this survey. E.g. {BC33 downstream}
3. Select the correct Format for your collector. E.g. *Sokkia SDR 33*
4. Select serial port-E.g. *Com1*
5. Select baud rate - E.g. *9600*
6. Select data bits- E.g. *8,none*
7. Place checkmark in the box for create a legal backup file.
8. Click OK
9. Press any Key on your computer keyboard
10. Send job from data collector. Data will scroll across Eagle Point window.
11. When Data collector is finished, turn collector off.
12. Press any key on keyboard. Survey has been transferred into an EP data file.

Importing a Survey from a File

1. From AutoCAD Click *NRCS/EP… Survey Import… Import ASCII File….*
2. Input a job name that describes this survey. E.g. {BC33 downstream}
3. Find the data File Name by Clicking the **Folder Icon** and browsing to the filename. OR input the path and filename of the file. E.g. {A:\BC33survey1.asc}
4. Select the correct format for your date file. E.g. *Coordinate*
5. Place checkmark in the box for create a legal backup file.
6. Click OK . The survey has been transferred into an EP data file.

Reducing a Survey & Placing nodes into the drawing

1. From AutoCAD Click *NRCS/EP… Survey Import… Reduce….*
2. Click to highlight the job you placed into the CAD drawing. E.g. *BC33 downstream*
3. Click OK. Most likely a Query warning box will appear that will show shot identities that don't match with the Field Code library. Those shots will be placed using the default field code.
4. Review the warnings if you want. Click Close on this Query warning box. You will see your points in the AutoCAD drawing.

Printing Survey Notes

1. From AutoCAD Click *NRCS/EP… Survey Import… Manage….*
2. Select the survey to manage by clicking the job name. E.g *BC33 downstream*
3. Click the **Printer Icon** in the lower left-hand side of box to brings up a Print Job box.

4. Place a checkmark by clicking on the copies you want printed out. You might want the original instrument file, and formatted file (this is the one that you will edit and use in creating your contours etc.)
5. Click on Print. Review your hard copies to identify what might need to be edited.
6. Click on Close to close out Manage Jobs box.

Editing Survey Data

1. From AutoCAD Click *NRCS/EP… Survey Import… Edit Formatted File….*
2. Use the pulldown to select your job to edit. E.g *BC33 downstream* .Click on Edit.
3. Edit the file. Rows that have YY, XX, ZZ or YC, XC, ZC are points that get placed as nodes.You can edit the descriptions and elevations by highlighting a cell entering new information. You can delete a row by clicking on *Tools… Delete Row*.
4. After editing, save the updates by clicking *File… Save* .
5. Then Click *File… Exit*. This takes you back into Eagle Point/AutoCad boxes.
6. Click on Close to close out Edit Formatted File box.
7. You can go back and get an updated printout of your editted Formatted file.
8. Repeat the steps for Reducing a Survey & Placing nodes into the drawing

Swivel Labels around all nodes

1. From AutoCAD, click *NRCS/EP… Survey Import… Node Swivel…*
2. Click Next
3. Selection Method *All*. Click Apply
4. Number of nodes appears. Click Next.
5. Specify Rotation angle. E.g {–45} degrees, *Absolute*. Click Next.
6. Click Apply.
7. Click Close.

Change Size of all node labels

1. From AutoCAD *NRCS/EP… Survey Import… Node Resize….*
2. Click Next
3. Selection Method *All*. Click Apply
4. Number of nodes appears. Click Next.
5. Click *Scale Attributes*. Input Relative scale factor. E.g. {2}. Click Next
6. Click Apply
7. Click Close.

Plotting the Survey Points using AutoCAD Paperspace

1. In AutoCAD Click on a layout tab *Layout1*
2. If this Layout has not been set up yet the Page Setup will appear. Otherwise Right Click the Layout1 Tab and Click Page Setup.
3. Click Plot Device and select the printer/plotter that you will use.E.g. {HP 5000}

4. Pulldown Plot sytle table to either *Monochrome.ctb* for B&W plotting or to *NRCS IA BWgray.ctb* for gray plotting of gray lines.
5. Click Layout Settings and select the paper size E.g. {11 x 17}. Plot Scale is typically left at 1:1.
6. Click OK
7. Check the AutoCAD status bar to make sure that *PAPER* is displayed. If *MODEL* appears click once to make *PAPER* appear.
8. Set the curent layer to 0.
9. From AutoCAD Click Insert… Block…Browse…
10. Browse to the desired title block E.g {c:\My Projects\Border and Title Blocks\std17base.dwg}. Highlight the filename. Click Open.
11. With none of the items checked Click OK.
12. Right Click the Layout1 Tab and Click Page Setup.
13. Click Plot area *Extents* and checkmark Plot offset *Center the plot*.
14. Click OK
15. Select the viewport border. Click *Modify… Properties…*
16. Pulldown the layer name to become *2.Vprt*
17. Click a grip of the viewport to resize the viewport within the area of the paper & title block.
18. Double click inside of the viewport. *PAPER* will switch to *MODEL*.
19. Use the mouse wheel to zoom the window to show the area that you want.
20. Double click outside of the viewport. *MODEL* will switch to *PAPER*.
21. Select the viewport border. Click *Modify… Properties…*
22. Look at the Custom Scale and determine an engineering scale that is near this custom scale. E.g. Custom Scale = 0.0111 is 1/0.0113 or 88.49' . 100 scale would be a useable scale.
23. Input a useable scale into the custom scale box as a {1/xxx} enter . E.g. Input 200 scale as {1/200} enter.
24. Pulldown the display locked to *Yes.*
25. Right Click the Layout1 Tab and Click Plot..
26. Click Full Preview to review the planned plot.
27. Press enter to return to the Plot screen.
28. Click OK to Plot.

Selecting layers to Not Plot within a Viewport

1. Go into the viewport: Double click inside of the viewport. MODEL will be the status item present.
2. In AutoCad, click on the **Layer Manager Icon**.
3. Use the *Current* (or *Active*) *VP Freeze* column to freeze layers within this view. E.g If I don't want my Original Ground Intermediate contours to show in this viewport, apply the *Current VP Freeze* to the layer *C.Topo.Ogrnd.Intr*.
4. Click OK

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Preparing Surface Model settings for Original Ground

1. From AutoCAD Click *NRCS/EP… Create Contours… Manage Surface Model….*
2. Click the **New Surface Model Icon**. This brings up New Surface Model box.
3. Click on the **Library icon** (looks like books on a shelf) and select *the Original Ground* surface model. Click Load Prototype. Click Yes. Click Close.
4. Input a Description name. E.g {Ognd}, which would represent original ground.
5. Once you have settings done *Click* OK.
6. Click Close to close out Manage Surface Models

Draw a boundary for the Surface model

1. In AutoCad, click on the **Layer Manager Icon**.
2. Set the *1.Brdr* layer to current.
3. Click OK close out of Layer Manager.
4. Click **Polyline** and draw a border around outside of the survey points without snapping to the points. To close the line cleanly, type {C} and press Enter. This will represent an outer limit for the surface model.

Creating a Surface model for Original Ground

1. From AutoCAD Click *NRCS/EP… Create Contours… Trianagulate Surface Model….*
2. Pulldown the name - for example *Ognd*.
3. Pulldown to set boundary line to *Select*.
4. Place a checkmark by *Display Model* if you want to see a temporary set of triangulation. Place a checkmark by *Place Triangles* if you want to have triangulation objects placed into the drawing.
5. Click Apply. [When repeating this step (like adding breaklines) a TIN message box appears just click YES to overwrite.] Pay attention to your autocad command lines as you continue.
6. Use AutoCAD selection methods to pick the objects to triangulate. One way to do this is by drawing a selection window. Once objects are selected press the enter key.
7. The command line should now ask you to select boundary. Select boundary by clicking with your mouse the border.
8. Click Close on the Triangulate Surface Model.

Placing the Contour lines into CAD

1. From AutoCAD Click *NRCS/EP… Create Contours… Make Intermediate & Index….*
2. Click Settings and verify or change the contour interval. Click OK.
3. Usually no checkmarks are place in any of the boxes.
4. Click Apply Contours will appear in CAD.
5. Click Close
6. Review the contours and determine if you want to add breaklines.

Adding Labels for Contours

1. From AutoCAD Click *NRCS/EP… Create Contours… Annotate….*
2. Verify the correct surface model.
3. Click Annotation Settings.
4. Pulldown Annotation Location to *Middle* and checkmark *Break Contour*. Checkmark Annotation Direction as *Uphill/Downhill*.
5. Click OK.
6. Method is usually *Crossing*.
7. Click Apply.
8. Click in CAD to select the starting point of the string of contour labels. Start at a lower elevation to get the text rotation correct.
9. Click the ending point for the line of labels near the higher elevation.
10. If the contour labels are not what you want, use the AutoCAD **Undo Icon** multiple times to return back to the unlabeled contour lines.
11. Click Close.

Adding Breaklines to get more realistic contours

1. In AutoCad, click on the **Layer Manager Icon**.
2. Select the *V.Brkl* or *V.Brkl.Flow.Line* or *V.Brkl.Bank* layer. Set to Current.
3. Click OK close out of Layer Manager.
4. Right Click the **Osnap Status.** Click *Settings…* and checkmark only *Node* and *Object Snap On*. Click OK.
5. Draw breaklines using AutoCAD **3D Polyline** and snap to the nodes.
6. From AutoCAD Click *NRCS/EP… Create Contours… Erase Existing Objects….* **Note: Eagle Point can not erase objects that are on frozen or locked layers.**
7. Checkmark *Contours* and any other items that have been placed into CAD. Click apply.
8. Repeat Creating a Surface model & Placing the Contour lines

Locking a Surface Model to Protect it

Lock the EP data for the surface model.

1. From AutoCAD Click *NRCS/EP… Create Contours… Manage Surface Models….*
2. Click on the correct surface model name. E.g. *Ognd*
3. Click the **Lock Icon**. This will protect the EP surface model.
4. Click Close.

Lock the layers of the CAD graphics.

5. In AutoCad, click on the **Layer Manager Icon**.
6. Select the contour layers. E.g. *C.Topo.Ognd.Indx* and *C.Topo.Ognd.Intr* layer. Click the *Lock* column.
7. Click OK. The graphics in CAD is locked. You will not be able to use the *Break Contours* method of labelling the contours if the layer is locked.

Plotting contours

1. Use the instructions from Plotting the Survey Points using AutoCAD Paperspace in combination with Selecting layers to Not Plot within a Viewport

Tranferring GPS survey and contours from EaglePoint/AutoCAD into ArcView

Use one of the following 3 different processes for converting georeferenced EaglePoint/AutoCAD surveys & contours into ArcView formats depending on the type of data that is wanted.

Surveys need to be done using any real world coordinate system.
(NAD 83 UTM Zone 15, US survey feet is typical.)

1. Use ArcView Projection Utility to process conversion.

- This process converts contours & survey points to be ready for use in an ArcView project that is based on UTM NAD 83 with meters as the X, Y reference but the elevation of the contours will be presented as feet.

Steps for contours

- In EaglePoint/AutoCAD
  Create contour lines as ACAD polylines
  Copy the contours into a blank dwg file.

- In ArcView
  Turn on Extensions…. Cad Reader & Projection Utility Wizard
  Add Theme… Select the DWG file (line item)
  Select that theme and Create a shapefile from those contours
  File… Projection Utility…
  Select the newly created shapefile and enter the original projection
  Enter UTM NAD 83 Zone 15, Meters as the output projection.
  The wizard will process the file and ask if you want to add a theme. (Be patient)
  Add the new shapefile as a theme- verify the location by importing the appropriate DOQ.

  The new shapefile is ready to be brought into an ArcView project.

Steps for survey points.

- In EaglePoint/AutoCAD
  Create survey points as Nodes or as plain points
  Copy the survey points into a blank dwg file.

- In ArcView
  Turn on Extensions…. Cad Reader & Projection Utility Wizard
  Add Theme… Select the DWG file (point item)
  Select that theme and Create shapefile from those points
  File… Projection Utility…
  Select the newly created shapefile and enter the original projection
  Enter UTM NAD 83 Zone 15, Meters as the output projection.
  The wizard will process the file and ask if you want to add a theme. (Be patient)
  Add the new shapefile as a theme- verify the location by importing the appropriate DOQ.

  The new shapefile is ready to be brought into an ArcView project.

2. Output contours from ACAD Map to a .shp file.

- This process converts the X, Y reference to UTM NAD 83 meters but does not maintain the elevations of the contour lines.

Contours must Not be EP objects.

Assign coordinate system to source drawing UTM83-15f
Map… Tools…Export ….
Esri shape file (.shp)
Options… Covert to… UTM83-15
Selection… (line entity for contours)(filter by layer C.Ctrs.Ogndl.Indx for contours)
Or Can use profiles to save and load these settings

Click Ok and the shape file is created.

3. Output contours & survey points to a new file that is in UTM83-15 (metric X,Y coords)

- This process converts the X, Y, & Z coordinates to meters.

- Use EaglePoint/ACAD to create a drawing containing the survey points & continuous contour lines.

- Use ACAD Map

New file
Attach source file
Map… Drawings….Define… Attach…

Assign coordinate system to drawings
Map… Tools… Assign Global Coord Sys
Active Project Code: utm83-15 (UTM NAD 83, Zone 15, Meters)
Source drawings… select….
Code: utm83-15f (UTM NAD 83, Zone 15, Feet)

Bring in contours into the new file
Map… Define Query…
Query Type: Property… Layer = C.Ctrs.Ogndl.Indx, C.Ctrs.Ogndl.Intr, etc
Query Mode: Draw
Click - Execute Query
Save the new dwg file

File can be accessed from ArcView with CAD Reader extension turned on.

Use the same steps using a new file for survey points except that Query should be
Map… Define Query…
Query Type: Property… Layer = V.Fcod.Misc, V.Fcod.…..etc
Query Mode: Draw
Click - Execute Query

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Pond Storage Calculations

Extracting Pool Area data to HydroYardage or SITES

1. In AutoCad, click on the **Layer Manager Icon**.
2. Select the *1.Bndr* layer. Set to Current.
3. Click OK close out of Layer Manager.
4. Click **Polyline** and draw a border that defines the limits of the storage area. To close the line cleanly, type {C} and press Enter.
5. From AutoCAD Click *NRCS/EP… Reservoir Detention…*
6. If you have not already created a Watershed Modelling Scenario, the Manage Scenarios box comes up. Click **New Scenario**.
7. Input a name. E.g. {Bear Creek 33}. Click OK
8. Click Close
9. Edit Reservoir appears. Click the **Folder Icon** by the Name line.
10. Click **New Reservoir**.
11. Input a name. E.g. {BC 33 Dam1}. Click OK
12. Click Close . *BC 33 Dam 1* will appear in the name line.
13. Pulldown Storage Method to *User-Defined Storage.*
14. Click Storage Parameters…
15. Click Generate from Surface Model…
16. Pulldown Surface Model to *Ognd*.
17. Input the Maximum elevation that you want to get storage up to. E.g. {1110}
18. Input the contour interval that you want get volumes at. E.g. {2.0}
19. Click on the boundary that you had drawn.
20. Take note of the minimum elevation that was generated. E.g. {1064.2}
21. Click Close
22. Input the minimum elevation, maximum elevation, and increment into the Rating curve limits. E.g. {1064.2}, {1110}, {2}
23. Click Apply.
24. Click the **Folder Icon** by the Name line.
25. Click Export…
26. Pulldown Save as type: to *Stage Storage from Surface Model(*.SAP)*
27. Input a filename: E.g. {BC33 dam1} Click Save.
28. Click Close
29. Click Close
30. Use the *Convert EP Pool Data* software to convert the info to a HydroYardage project or to SITES formatted data.

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Storage Volume Only

Draw a Boundary around the Volume Calculation Area

1. In AutoCad, click on the **Layer Manager Icon**.
2. Set the *1.Brdr* layer to current.
3. Click OK close out of Layer Manager.
4. Click **Polyline** and draw a border around outside of the survey points without snapping to the points. To close the line cleanly, type {C} and press Enter. This will represent an outer limit for the volume calculation area.

Calculating a Storage Volume at a Defined Elevation

1. From AutoCAD Click *NRCS/EP… Volumes… Calculate Prismoidal….*
2. Pulldown original surface model to the desired name E.g. {*Ognd*} or {*Basin*}
3. Check mark Use Constant Elevation
4. Input the defined elevation E.g. {1127.5}
5. Check mark Use Boundary
6. Click apply.
7. Select the boundary.
8. Pulldown the volume unit to switch to Cu Ft, Ac Ft, or Cu Yd.
9. Click the **Printer Icon** to print.
10. When done Click Close. Click Close.

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Embankment with a Berm

Placing the Centerline & Top of Dam

1. In AutoCad, click on the **Layer Manager Icon**.
2. Select the *C.Clin.Embk.New* layer. Set to Current.
3. Click OK close out of Layer Manager.
4. Click **Polyline** and draw a line that represent the centerline alignment for the embankment. This line is better if it is longer than the embankment.
5. From AutoCAD Click *NRCS/EP… Create Contours… Make User Defined….*
6. Surface model should be Ognd. No checkmarks are usually used. Input the elevation for the end of the dam to tie into. E.g. {1104}
7. Click Apply
8. Input the elevation for the berm. E.g. {1099}
9. Click Apply
10. Click Close
11. In AutoCad, click on the **Layer Manager Icon**.
12. Select layers to freeze or turn off.
13. Select the *C.Plan.Embk* layer. Set to Current.
14. Click OK close out of Layer Manager.
15. Click AutoCAD's **Offset** . Input ½ of top width. E.g. {6}. Press enter.
16. Select the line representing the centerline alignment. Press enter.
17. Click on either side of the centerline.
18. Press enter
19. Click AutoCAD's **Trim** .
20. Select the contour line of the top of dam as the cutting edge. Press enter.
21. Click to trim the ends of the line that goes past the contour. Press enter.
22. Select the trimmed line. Right Click and click *Properties*.
23. Pulldown the layer to *C.Plan.Embk*
24. From AutoCAD Click *NRCS/EP… Create Site Layout… 3D Feature Editor….*
25. Select the trimmed line that is the edge of dam.
26. Input the correct end of dam elevation for point 1 E.g. {1104}
27. Press tab. Click the **Right Arrow**.
28. Input the correct end of dam elevation for point 2 E.g. {1104}
29. Press tab. Click the **Right Arrow**.
30. Add more points along the line to allow for more overfill at the deepest point. Click **Insert Points**.
31. Click *Divide into Segements*. Input number of segement desired. E.g. {3}
32. Click Apply only once!
33. Click Close
34. Click the **Right Arrow**.

35. Input the elevation of the new point 2 for the overfill. E.g {1105.3}
36. Press tab. Click the **Right Arrow**.
37. Input the elevation of the new point 3 for the overfill. E.g {1105.3}
38. Press tab.
39. Click Close
40. From AutoCAD Click *NRCS/EP… Create Site Layout… 3D Offset….*
41. Input the topwidth distance to offset. E.g. {12}
42. Input the relative elevation {0}.Click Apply
43. Select the embankment line by clicking near one end. When offset line is placed, it will be put on the right side of the line when looking towards the far end of the line if entered as {+12} or left side if entered as {–12}.
44. Click AutoCAD's **Extend**.
45. Select the top of dam contour line as the boundary edge. Press enter.
46. Click the ends of the line to extend the contour. Press enter.

Placing the Toes & Pool Berm of the Dam

1. From AutoCAD Click *NRCS/EP… Create Site Layout… Project Slopes to Surface Model….*
2. Pulldown to the original ground surface model name. E.g {Ognd}
3. Input the proper fill slope as a negative number. E.g. {-3} as H/V
4. Uncheckmark *Erase all Existng Slope Projections…*
5. Click Apply
6. Select the downstream edge of the dam.
7. Click on the downstream side of the selected line.
8. Selct the upstream edge of the dam.
9. Click on the upstream side of the selected line.
10. Press Enter
11. Checkmark *Constant Elevation*. Input the Berm elevation. E.g {1099}
12. Click Apply
13. Select the upstream edge of the dam.
14. Click on the upstream side of the selected line.
15. Press Enter. Click Close.
16. From AutoCAD Click *NRCS/EP… Create Site Layout… 3D Offset….*
17. Input the pool berm width to offset. E.g. {10}
18. Input the relative elevation {0}.Click Apply
19. Select the catch line that was projected to the berm elevation by clicking near the left end of the dam.
20. Click Close
21. Click AutoCAD's **Trim** .
22. Select the upstream toe catch line as the cutting edge. Press enter.
23. Type E {Edge}. Type N {No Extend}.
24. Click to trim the ends of the pool berm catchline that goes past the toe. Press enter.
25. Click AutoCAD's **Trim** .
26. Select the trimmed downstream edge of the pool berm as the cutting edge. Press enter.

27. Click to trim the portion of the toe upstream of the pool berm. Press Enter.
28. Select the upstream slope projection lines that go upstream of the toe or downstream pool berm line. Press delete.
29. From AutoCAD Click *NRCS/EP… Create Site Layout… Project Slopes to Surface Model….*
30. Pulldown to the original ground surface model name. E.g {Ognd}
31. Input the proper fill slope as a negative number. E.g. {-3} as H/V
32. Uncheckmark *Constant Elevation* and *Erase all Existng Slope Projections…*
33. Click Apply
34. Select the upstream edge of the pool berm.
35. Click on the upstream side of the selected line.
36. Press Enter. Click Close.
37. When slope lines look correct, select all of the slope projection lines and change their layer property to *C.Topo.Embk.Slop*.

Making the Outside Toes of the Dam into One Object

1. Select all of the lines that represent the edges of the berms and the toe or top of dam. Right Click.
2. Click *Properties* . Pulldown the layer to *C.Plan.Embk*
3. Press Esc.
4. In AutoCad, click on the **Layer Manager Icon**.
5. Turn off or freeze layers so that only the *C.Plan.Embk* lines show.
6. Click OK close out of Layer Manager.
7. Click AutoCAD **3D Polyline**. **Draw** in lines that close the ends of the dam and wave berm (use Osnaps settings with endpoints).
8. From AutoCAD Click *NRCS/EP… Create Site Layout… 3D Join….*
9. Select the lines representing the toes where the dam meets the original ground. Press enter.
10. Select the toe to see if has all become one 3D Polyline. If not ends grips may need to be re-snapped to ends of adjoining lines.

Preparing Surface Model settings for the Embankment

1. From AutoCAD Click *NRCS/EP… Create Contours… Manage Surface Model….*
2. Click the **New Surface Model Icon**. This brings up New Surface Model box.
3. Click on the **Library icon** (looks like books on a shelf) and select the *Embankment* surface model. Click Load Prototype. Click Yes. Click Close.
4. Input a Description name. E.g {Embk}, which would represent embankment.
5. Once you have settings done *Click* OK.
6. Click Close to close out Manage Surface Models

Creating a Surface model for the Embankment

1. From AutoCAD Click *NRCS/EP… Create Contours… Trianagulate Surface Model….*
2. Pulldown the name - for example *Embk.*
3. Pulldown to set boundary line to *Select*.
4. Place a checkmark by *Display Model* if you want to see a temporary set of triangulation. Place a checkmark by *Place Triangles* if you want to have triangulation objects placed into the drawing.
5. Click Apply.
6. Use AutoCAD selection methods to pick the objects to triangulate. One way to do this is by drawing a selection window. Once objects are selected press the enter key.
7. The command line should now ask you to select boundary. Select boundary by clicking with your mouse the toe of the dam.
8. Click Close on the Triangulate Surface Model.
9. From AutoCAD Click *NRCS/EP… Create Contours… Trianagulate Surface Model….*

Verifying the Embankment Surface Model

1. From AutoCAD Click *NRCS/EP… Create Contours… Make Intermediate & Index….*
2. Verify the surface model name *Embk*
3. Usually no checkmarks are place in any of the boxes.
4. Click Apply Contours will appear in CAD.
5. Click Close
6. Review the contours to determine whether the surface model is correct.
7. From AutoCAD Click *NRCS/EP… Create Contours…Track Coordinates….*
8. Verify the surface model name *Embk*
9. Click Apply
10. Move cursor around in CAD and elevations will be displayed.
11. Click Close
12. From AutoCAD Click *NRCS/EP… Create Contours… Erase Existing Objects….*
13. Checkmark *Contours* and any other items that have been placed into CAD. Click apply. Click Close

Computing the Earthfill Volume for the Embankment

1. From AutoCAD Click *NRCS/EP… Volumes… Calculate Prismoidal….*
2. Pulldown original surface model to *Ognd*
3. Pulldown final surface model to *Embk*
4. Click apply. Click the **Printer Icon** to print.
5. When done Click Close.

Computing the Earthfill Volume for the Embankment & Stripping

1. From AutoCAD Click *NRCS/EP… Create Contours… Manage Surface Model….*
2. Highlight *Ognd* surface model
3. Click the **Copy Surface Model Icon**.
4. Checkmark *Displacemet Elevation*.
5. Input the stripping depth as a negative number. E.g. {-0.5}.
6. Input a name for the stripping depth. E.g. {Strp}
7. Click the **Properties Icon**.
8. Pulldown the surface model name between *Ognd* and *Strp* to verify that stripping is lower than the original ground. Click Close
9. Click the **Modify Surface Model Icon**.
10. Click on the **Library icon** (looks like books on a shelf) and select the *Stripping* surface model. Click Load Prototype. Click Yes. Click Close.
11. Once you have settings done *Click* OK.
12. Click Close to close out Manage Surface Models
13. From AutoCAD Click *NRCS/EP… Volumes… Calculate Prismoidal….*
14. Pulldown original surface model to *Strp*
15. Pulldown final surface model to *Embk*
16. Click apply. Click the **Printer Icon** to print.
17. When done Click Close.

Core Trench Layout & Volumes

Creating the Core Trench Bottom Width & Catch Lines

1. Make sure that layers with the centerline of dam and user defined contour of the pool elevation are turned on and thawed.
2. From AutoCAD Click *NRCS/EP… Create Site Layout… Project Plan Objects….*
3. Pulldown to the original ground surface model name. E.g {Ognd}
4. Checkmark *Make Copy of Object…*
5. Click Apply
6. Select the centerline of the dam.
7. Press Enter
8. Click Close
9. Click AutoCAD's **Trim** .
10. Select the pool elevation line as the cutting edge. Press enter.
11. Type E {Edge}. Type N {No Extend}.
12. Click to trim the ends of the core trench line that goes above the pool elevation. Press enter.
13. From AutoCAD Click *NRCS/EP… Create Site Layout… 3D Offset….*
14. Input ½ of the core trench bottom width to offset. E.g. {6}
15. Input the relative elevation {-4}.Click Apply
16. Select the trimmed CL of core trench near the left end.
17. Click Apply

18. Select the trimmed CL of core trench near the right end.
19. Click Close
20. Click the AutoCAD **3D Polyline Icon**
21. Snap to the left end of the upstream core line. (use Osnaps settings with endpoints)
22. Snap to the left end of the downstream core line. Press Enter.
23. Press Enter.
24. Snap to the right end of the upstream core line.
25. Snap to the right end of the downstream core line. Press Enter.
26. Select all of the lines that represent the edges of the core bottom. Right Click.
27. Click *Properties* . Pulldown the layer to *C.Topo.Cort.Feat*
28. Press Esc.
29. Set the Current layer to *C.Topo.Cort.Feat*
30. From AutoCAD Click *NRCS/EP… Create Site Layout… 3D Join….*
31. Select the lines representing the core trench bottom. Press enter.
32. Select the toe to see if has all become one 3D Polyline. If not, endpoint grips may need to be re-snapped to ends of adjoining lines.

33. From AutoCAD Click *NRCS/EP… Create Site Layout… Project Slopes to Surface Model….*
34. Pulldown to the original ground surface model name. E.g {Ognd}
35. Input the proper fill slope as a negative number. E.g. {-3} as H/V
36. Uncheckmark *Constant Elevation* and *Erase all Existng Slope Projections…*
37. Click Apply
38. Select the core trench.
39. Click on the outside of the selected line.
40. Press Enter. Click Close.
41. When slope lines look correct, select all of the slope projection lines and change their layer property to *C.Topo.Cort.Slop*.

Preparing Surface Model settings for the Core Trench

1. From AutoCAD Click *NRCS/EP… Create Contours… Manage Surface Model….*
2. Click the **New Surface Model Icon**. This brings up New Surface Model box.
3. Click on the **Library icon** (looks like books on a shelf) and select the *Core Trench* surface model. Click Load Prototype. Click Yes. Click Close.
4. Input a Description name. E.g {Core}, which would represent the core trench.
5. Once you have settings done *Click* OK.
6. Click Close to close out Manage Surface Models.

Creating a Surface model for the Core Trench

1. From AutoCAD Click *NRCS/EP… Create Contours… Trianagulate Surface Model….*
2. Pulldown the name - for example *Core*.

3. Pulldown to set boundary line to *Select*.
4. Place a checkmark by *Display Model* if you want to see a temporary set of triangulation. Place a checkmark by *Place Triangles* if you want to have triangulation objects placed into the drawing.
5. Click Apply.
6. Use AutoCAD selection methods to pick the objects to triangulate. One way to do this is by drawing a selection window. Once objects are selected press the enter key.
7. The command line should now ask you to select boundary. Select boundary by clicking with your mouse the toe of the dam.
8. Click Close on the Triangulate Surface Model.

Verifying the Core Trench Surface Model

1. From AutoCAD Click *NRCS/EP… Create Contours… Make Intermediate & Index….*
2. Verify the surface model name *Core*
3. Usually no checkmarks are place in any of the boxes.
4. Click Apply Contours will appear in CAD.
5. Click Close
6. Review the contours to determine whether the surface model is correct.
7. From AutoCAD Click *NRCS/EP… Create Contours…Track Coordinates….*
8. Verify the surface model name *Core*
9. Click Apply
10. Move cursor around in CAD and elevations will be displayed.
11. Click Close
12. From AutoCAD Click *NRCS/EP… Create Contours… Erase Existing Objects….*
13. Checkmark *Contours* and any other items that have been placed into CAD. Click apply. Click Close

Computing the Earthwork Volume for the Core Trench

1. From AutoCAD Click *NRCS/EP… Volumes… Calculate Prismoidal….*
2. Pulldown stripping surface model to *Strp*
3. Pulldown final surface model to *Core*
4. Click apply. Click the **Printer Icon** to print.
5. When done Click Close.

Eagle Point Steps Using the NRCS/EP Customized Menu

Notation Method
Button to Press *Displayed Text* **Icon** Action {Text to Enter} *Menu Item…*

Profiles/Sections

Creating the Reference Location for a Profile in the Drawing

1. From AutoCAD Click *NRCS/EP… Profiles/Sections…Setup Profile Coordintate System ….*
2. Click the **New Profile Coordinate System Icon**.
3. Input a Profile name. E.g. {Centerline Dam}.
4. Click into the X box. Click the **Pick In CAD** button.
5. Select a location in the drawing that will not overlap a profile with the plan view part of the drawing.
6. Click into the Station box. Input a Stationing that you want to correspond to this reference location in the drawing. E.g. {0} Press Tab
7. Input an elevation that you want to correspond to this reference location in the drawing. E.g. {1100} Press Tab
8. Click OK
9. Click Close.

Creating the Profile in the Drawing

1. Decide the horizontal and vertical scales that you want.
2. From AutoCAD Click *NRCS/EP… Plot Scale…*
3. Input the horizontal and vertical scales. E.g. Horz ={40}, Vert = {10}
4. Click OK.
5. Determine the Reference station of the left end of the Centerline alignment line. E.g. {-275}
6. From AutoCAD Click *View… Named Views… New…*
7. Input a view name. E.g. {Dam} Click OK.
8. From AutoCAD Click *NRCS/EP… Profiles/Sections…Profile from Surface Model ….*
9. Highlight the Surface Models that you want profiles of. *Ognd, Embk.*
10. Click OK.
11. Select the Centerline alignment line.
12. Select the same line.
13. Click near the left end of the line.
14. Input the beginning stationing of the line. E.g. {-270} Click OK.
15. Locate the Profile view within the drawing and window in around it.
16. From AutoCAD Click *View… Named Views… New…*
17. Input a view name. E.g. {CL dam profile} Click OK.

Placing a Grid on the Profiles

1. From AutoCAD Click *NRCS/EP… Profiles/Sections…Grid ….*
2. Check Paper Units and input the grid dimensions for the paper. E.g. For Grids that fill the full title block:
   For 11x17: Length={14}, Height={10}, Area Height ={.25}, Elev Width ={.5}.
   For 22x34: Length={28}, Height={20}, Area Height ={0.5}, Elev Width={1}.
3. If used for 11x17: click the **CAD settings icon** and change the Datum Elev and Stations Text size to {0.12}. and click apply for each one.
   For 22x34: Datum Elev={.24}, Stations={.24}.
4. Click OK.
5. Input desired Station Interval labeling. E.g. {40} and Input desired Elevation Interval labeling. E.g. {10}.
6. Click OK.
7. Click to place the outline of the Grid to enclose the Profile lines.
8. If Grid is not the right size, select it and press delete.

Plotting the Profiles in Paperspace

1. In AutoCAD Right click on a Layout tab and Click *New Layout…*
2. Click on any used layout tab *Layout tab*
3. If this Layout has not been set up yet the Page Setup will appear. Otherwise Right Click the Layout1 Tab and Click Page Setup.
4. Click Plot Device and select the printer/plotter that you will use.E.g. {HP 5000}
5. Pulldown Plot sytle table to either *Monochrome.ctb* for B&W plotting or to *NRCS IA BWgray.ctb* for gray plotting of gray lines.
6. Click Layout Settings and select the paper size E.g. {11 x 17}. Plot Scale is typically left at 1:1. (Use 1:2 when plotting a 22x34 drawing to an 11x17 printer)
7. Click OK
8. Check the AutoCAD status bar to make sure that *PAPER* is displayed. If *MODEL* appears click once to make *PAPER* appear.
9. Set the curent layer to 0.
10. From AutoCAD Click Insert… Block…Browse…
11. Browse to the desired title block E.g {c:\My Projects\Border and Title Blocks\std17base.dwg}. Highlight the filename. Click Open.
12. With none of the items checked Click OK.
13. Right Click the Layout1 Tab and Click Page Setup.
14. Click Plot area *Extents* and checkmark Plot offset *Center the plot*.
15. Click OK
16. Select the viewport border. Click *Modify… Properties…*
17. Pulldown the layer name to become *2.Vprt*
18. Click a grip of the viewport to resize the viewport within the area of the paper & title block.
19. Double click inside of the viewport. *PAPER* will switch to *MODEL*.
20. Click AutoCAD *View… Named Views…*

21. Highlight the profile named view that you want to appear in this viewport. E.g. *CL dam profile*. Click Set Current.
22. Click OK.
23. Double click outside of the viewport. *MODEL* status will switch to *PAPER*
24. Select the viewport border. Click *Modify… Properties…*
25. Input the Horizontal Scale of the profile into the custom scale box as a {1/xxx} enter . E.g. Input 40 scale as {1/40} enter.
26. Double click inside of the viewport. *PAPER* status will switch to *MODEL*.
27. Without zooming in or out, press the mouse wheel down to pan the profile until it fits correctly in the title block.
28. Double click outside of the viewport. *MODEL* status will switch to *PAPER*
29. Select the viewport border. Click *Modify… Properties…*
30. Verify that the scale is still correct.
31. Pulldown the display locked to *Yes.* With Display Locked you cannot change the scale of the viewport or pan the viewport. You can still resize the Viewport.
32. Right Click the Layout1 Tab and Click Plot..
33. Click Full Preview to review the planned plot.
34. Press enter to return to the Plot screen.
35. Click OK to Plot.

Adding an Extra Viewport to a Layout

1. Click on the Layout Tab where you want to add a viewport.
2. Check the AutoCAD status bar to make sure that *PAPER* is displayed. If *MODEL* appears click once to make *PAPER* appear.
3. From AutoCAD Click *View… Viewports…1 Viewport ….*
4. Click in the layout to specify the lower left corner of the new viewport.
5. Click in the layout to specify the upper right corner of the new viewport.
6. Select the viewport border. Click *Modify… Properties…*
7. Pulldown the layer name to become *2.Vprt*

Setting Fine Gridlines to Grayscale

1. In AutoCad 2000i, click on the **Layer Manager Icon**.
2. Click Restore State…
3. Highlight *Gridlines Grayscale*
4. Click Restore
5. Click OK close out of Layer Manager.
6. Note: Using the NRCS IA BWgray.ctb Plot style table to have gray lines plotted as gray.

OR

1. In AutoCad 2000 with Express Tools, switch to the Model Tab.
2. Click Express… Layers… Layer Manager…
3. Highlight *Gridlines Grayscale*
4. Click Restore

5. Click Close
6. Note: Using the NRCS IA BWgray.ctb Plot style table to have gray lines plotted as gray.

Eagle Point Steps Using the NRCS/EP Customized Menu

Notation Method
Button to Press *Displayed Text* **Icon** Action {Text to Enter} *Menu Item…*

Earthen Storage Pond

Placing an Earthen Storage Pond Template

1) From AutoCAD Click *NRCS/EP… NRCS Storage Pond…Place Storage Pond into CAD ….*
2) Input the dimensions, slopes and top of fill elevation.
3) Click Place into CAD.
4) Select the point in CAD for the lower left corner of the inside top of fill.
5) To move the template and maintain the same elevation:
   a) Turn *Osnaps off*, select any line of the pond, Click the **Move icon**.
   b) Click any location as a reference point for moving the storage pond.
   c) Click the new location of the corner.
6) To move the template and change the elevation:
   a) Select any line of the pond, Click the **Move icon**.
   b) Snap to an outer gray corner of the storage pond.
   c) Snap to a contour line at the new location of the corner **OR**
   d) Shift/RightClick…Click *Point Filters… XY…* Select the new location of the corner. Input the new elevation of the snapped point {1105.5}. Press Enter
7) To rotate the pond:
   a) Select the pond. Click the **Rotate icon**.
   b) Snap to the pivot point.
   c) Click to place the new rotation angle.

Note: If a second storage pond graphic is going to be placed into CAD the selection group must be renamed.

8) AutoCAD Click *NRCS/EP… NRCS Storage Pond…Manage Object Groupings ….*
9) Highlight *StorPond*
10) Input a new Group Name. E.g. {Pond1}
11) Click Rename
12) Click OK

Preparing Surface Model settings for the Embankment

1. From AutoCAD Click *NRCS/EP… Create Contours… Manage Surface Model….*
2. Click the **New Surface Model Icon**. This brings up New Surface Model box.
3. Click on the **Library icon** (looks like books on a shelf) and select the *Embankment* surface model. Click Load Prototype. Click Yes. Click Close.
4. Input a Description name. E.g {EmbkInside}, which would represent embankment template.
5. Once you have settings done *Click* OK.

6. Click the **Copy Surface Model Icon**.
7. Pulldown the embankment template model. E.g. *EmbkInside*.
8. Input a surface model description name. E.g {EmbkBal}, which would represent embankment that has been moved up or down to get balanced quantities .
9. Click OK. Click Close.
10. Click Close to close out Manage Surface Models

Creating a Surface model for the Embankment Template

1. From AutoCAD Click *NRCS/EP… Create Contours… Trianagulate Surface Model….*
2. Pulldown the name - for example *EmbkInside*.
3. Pulldown to set boundary line to *Select*.
4. Place a checkmark by *Display Model* if you want to see a temporary set of triangulation. Place a checkmark by *Place Triangles* if you want to have triangulation objects placed into the drawing.
5. Click Apply.
6. Use AutoCAD selection methods to pick the pond lines. Press enter.
7. Select the outer line of the pond.
8. Click Close on the Triangulate Surface Model.

Verifying the Embankment Template Surface Model

1. From AutoCAD Click *NRCS/EP… Create Contours… Make Intermediate & Index….*
2. Verify the surface model name *EmbkInside*
3. Usually no checkmarks are place in any of the boxes.
4. Click Apply Contours will appear in CAD.
5. Click Close
6. Review the contours to determine whether the surface model is correct.
7. From AutoCAD Click *NRCS/EP… Create Contours…Track Coordinates….*
8. Verify the surface model name *Embk*
9. Click Apply
10. Move cursor around in CAD and elevations will be displayed.
11. Click Close
12. From AutoCAD Click *NRCS/EP… Create Contours… Erase Existing Objects….*
13. Checkmark *Contours* and any other items that have been placed into CAD. Click apply. Click Close

Balancing the Embankment Volumes

1. From AutoCAD Click *NRCS/EP… Volumes… Balance….*
2. Pulldown original surface model as Original Ground. E.g. *Ognd*
3. Pulldown Final surface model as Embankment template. E.g. *EmbkInside*
4. Pulldown Balanced surface model as Balanced Embankment. E.g. EmbkBal
5. Input any upward or downward displacement limits.

6. Pulldown material as *Balanced*
7. Input upper and lower limits E.g. {20} and {20}
8. Click Settings…
9. Input slopes H/V: E.g. Cut = {3.0}, Fill = {-3.0}
10. Checkmark *Keep When complete*
11. Checkmark *Use Compaction Factor*
12. Input shrinkage for cut. E.g. Cut = {-25}
13. Checkmark *Calculate Prismoidal for Balanced*.
14. Click OK Click Apply.
15. Click **Print Icon** to get printed results.
16. Click Close
17. To move the Pond CAD lines to the final elevation select any inner pond line. Click **Move**.
18. Click any point. Click a second location to displace it.
19. Select the pond. Click **Move**
20. Snap to a corner on the outer line. Snap to the corresponding corner of the slope projection lines.
21. Select the pond and verify elevation of grips.

Notation Method
Button to Press *Displayed Text* **Icon** Action {Text to Enter} *Menu Item…*

Inserting Georeferenced images

Insert an Ortho photo first and a USGS map second.

1. In AutoCad, click on the **Layer Manager Icon**.
2. Set the *1.Doqs* layer to current for Ortho photos or *1.Drgs* for USGS maps.
3. Click OK close out of Layer Manager.
4. From AutoCAD Click *Map… Image… Insert….*
5. Browse to the image file- usually located in the G: drive (geodata). E.g. *G:\doqqs\highlandvilleNE.tif*. DOQ photos by quarter quadrangle name. USGS drgs by lat/long/row/column name. *G:\drgs\43093\o43093c7.jpg.*
6. Checkmark Modify Correlation.
7. Click Open.
8. Pulldown Units for Insertion Point to *Meters*.
9. Click OK.
10. For USGS drgs: Select the image. Right click. Click *Properties*. Pulldown transparency to *Yes*. Click transparency color … Click Select < . Select the color in the image that you want to have be transparent. Click OK.

Displaying a limited portion of an Image

1. In AutoCad, select the image.
2. Pulldown *Modify… Clip… Image…*
3. Input {N} for New. Press Enter
4. Input {R} for Rectangular. Press Enter
5. Click Upper left corner of your planned image display.
6. Click Lower right corner of your planned image display.

- If image is on top of objects: Select the image. *Click Tools… Display Order… Send to back…*

Preparing the Surface Model Settings of a Digital Elevation Model

A Digital Elevation Model (DEM) is a good planning tool. It is based on points located every 30 meters in a grid.

1. From AutoCAD Click *NRCS/EP… Create Contours… Manage Surface Model….*
2. Click the **New Surface Model Icon**. This brings up New Surface Model box.
3. Click on the **Library icon** (looks like books on a shelf) and select the *Digtial Elevation Model* surface model. Click Load Prototype. Click Yes. Click Close.
4. Input a Description name. E.g {DEM}, which would represent original ground.
5. Once you have settings done *Click* OK.
6. Click Close to close out Manage Surface Models

Draw a boundary for the DEM Surface model

If you want a limited area for the DEM surface model to be created, create a boundary.

1. In AutoCad, click on the **Layer Manager Icon**.
2. Set the *1.Brdr* layer to current.
3. Click OK close out of Layer Manager.
4. Click **Polyline** and draw a border around the area being planned. To close the line cleanly, type {C} and press Enter.

Creating a Surface model for a DEM

1. From AutoCAD Click *NRCS/EP… Create Contours… Trianagulate Surface Model….*
1. Pulldown the name - for example *DEM*.
2. Pulldown to set boundary line to *Select* if you are using a boundary to limit the area used for the DEM.
3. You will probably not want to *Display Model* or *Place Triangles* because of the large area of the DEM.
4. Checkmark Use External Point Files.
5. Click Build File List
6. Click New External File
7. Browse to the file name: E.g. *G:\IaDEM\43093\o43093c7.txt*.
8. Pulldown X,Y,Z, Description.
9. Click OK
10. Click Close
11. Click Apply.
12. The external data points will be used. Usually no CAD objects will need to be selected. Press enter.
13. If you have choosen to use a boundary, the command line should now ask you to select boundary. Select boundary by clicking with your mouse the border.
14. Click Close on the Triangulate Surface Model.

Placing the Contour lines into CAD

1. From AutoCAD Click *NRCS/EP… Create Contours… Make Intermediate & Index….*
2. Click Settings and verify or change the contour interval. Recommended settings: Smoothing {0}, Polynomial {0}, Intermediate {4}, Index {20}, Construction Method *LWpolylines*. Changing these can increasing processing time excessively. Click OK.
3. Usually no checkmarks are place in any of the boxes.
4. Click Apply Contours will appear in CAD.
5. Click Close
6. Review the contours.

Notation Method
Button to Press *Displayed Text* **Icon** Action {Text to Enter} *Menu Item…*

Exporting Clearing Limits to Data Collector

Place nodes along the Clearing limit polyline in CAD.

1. From EP Click *Products… COGO… Settings… Entry Options…Node Placement…*
2. Input a node ID for labeling. E.g. {CLR1} for Clearing limit nodes to export.(It must end with a number) (Data collector must be set to use alphanumeric record numbers)
3. Input Elevation as *Constant* & {0}
4. Pulldown Field Code default to *CLR* if you only want label and elevation of node to show. Or Pulldown to *HUB* to have N & E show up.
5. Pulldown to *Default Description* and Input {CLR} for clearing limit.
6. Click OK
7. From EP Click *Products… COGO… Nodes… Snap to Object…*
8. Click Next
9. Select the polyline that has the corners of the Clearing Limits. (or press enter to get out of AutoCAD selection mode)
10. Press Enter
11. Click Next
12. Uncheck Do Not Place Duplicate Notes
13. Click Apply
14. Click Snap Options & Descriptions
15. Input {CLR} (for Clearing Limit) as the Line Endpoints.
16. All other Points could be Unchecked.
17. Click OK
18. Click Apply
19. Click Close
20. Click *Report… Nodes…*
21. Pulldown to *Description*
22. Input the Description used earlier {CLR}.
23. Click Apply
24. Click Close
25. View the report and Click the **Print Icon**.
26. When done printing Click Close.

Upload the points to the Data Collector

1. From EP Click *Products… Data Collection… Jobs… Upload to Collector…*
2. Pulldown upload Data from Project
3. Select the correct Format for your collector. E.g. *Sokkia SDR 33*
4. Select serial port-E.g. *Com1*
5. Select baud rate - E.g. *9600*
6. Select data bits- E.g. *8,none*
7. Click OK
8. Pulldown to *Description*

9. Input the Description used earlier {CLR}
10. Can do multiple selections or AutoCAD selection method also.
11. When done Click OK
12. Have Data Collector ready and then press Enter
13. Input a name for the new Data collector file {BC33stake}
14. Press Enter
15. Press any key

Eagle Point Steps Using the NRCS/EP Customized Menu

Notation Method
Button to Press *Displayed Text* **Icon** Action {Text to Enter} *Menu Item…*

Circular Concrete Tank

Placing a Circular Tank in the Plan View

1. In AutoCad, click on the **Layer Manager Icon**.
2. Select the *W.Plan.Conc.New* layer. Set to Current.
3. Click OK close out of Layer Manager.
4. Click **Circle** and draw a circle that represents the diameter of concrete tank.
5. Click **Offset**
6. Input the wall thickness of the tank in feet. E.g {8/12} Press Enter.
7. Select the circle that represents the inside diameter of the tank.
8. Click outside of the circle.
9. Click **Arc**
10. Press {C} for Center. Press Enter
11. Shift Right-Click and Click *Center*.
12. Click to the center snap of the circular concrete tank.
13. Calculate the radius of the tank and add the wall thickness + the exterior footing width + 2’ for additional excavation. E.g. 50’/2 + (8” + 12”)/12 + 2’ = 28.667.

Dimensions based on MWPS TR9 – NRCS Drawing IA900

Tank Depth	Dimension to add to radius to allow for wall thickness, footing width & 2’ of additional excavation	Footing Thickness
8’	3.667’	0.833’
10’	3.833’	1’
12’	4’	1’
14’	4.083’	1’

14. Input the start point of arc relative to the center of the tank: {@28.667,0} Press enter.
15. Input {A} to allow angle entry. Press Enter
16. Input {359.99} to give a nearly closed arc. Press Enter
17. From AutoCAD Click *NRCS/EP… Create Site Layout… Interpolate Additional Geometry….*
18. Input the correct elevation for the excavation subgrade. E.g. Floor elev 56 - 0.833 footing thickness= 55.167. Use{55.167}
19. Press tab.
20. Input the correct elevation for the excavation subgrade. E.g. {55.167}
21. Press tab.
22. Uncheck *Make copy of object…*
23. Click *Settings*
24. Press Tab

25. Input {5} for minimum length of segments. Press Tab
26. Input {5} for maximum length of segments. Press Tab
27. Click Ok
28. Click Apply
29. Select the arc that represents flat pad subgrade.
30. Click Close
31. Select the subgrade line (it is now a 3Dpolyline) . Right Click.
32. Click *Properties* . Pulldown the layer to *C.Plan.Exca*
33. Update the Closed property to *Yes*.
34. Press Esc.

Placing the Toes of the Subgrade Excavation

1. From AutoCAD Click *NRCS/EP… Create Site Layout… Project Slopes to Surface Model….*
2. Pulldown to the original ground surface model name. E.g {Ognd}
3. Input the proper cut slope as a positive number. E.g. {1.5} as H/V
4. Input the fill slope as a negative number. E.g. {-3} as H/V
5. Uncheckmark *Erase all Existing Slope Projections…*
6. Click Apply
7. Select the subgrade line.
8. Click on the outside of the subgrade line.
9. Press Enter Click Close
10. Select all of the slope projection lines and change their layer property to *C.Topo.Stex.Slop*.

Make the Outside Toe of the Excavation into a Closed Object

1. Select all of the lines that represent the bottom and top of excavation cut slope. Right Click.
2. Click *Properties* . Pulldown the layer to *C.Plan.Exca*
3. Update the Closed property to *Yes*.
4. Press Esc.

Preparing Surface Model settings for the Tank Excavation

1. From AutoCAD Click *NRCS/EP… Create Contours… Manage Surface Model….*
2. Click the **New Surface Model Icon**. This brings up New Surface Model box.
3. Click on the **Library icon** (looks like books on a shelf) and select the *Structure Excavation* surface model library. Click Load Prototype. Click Yes. Click Close.
4. Input a Description name. E.g {Tank Excavation}, which would represent excavation for the tank subgrade.
5. Once you have settings done *Click* OK.
6. Click Close to close out Manage Surface Models

Creating a Surface model for the Tank Excavation

1. From AutoCAD Click *NRCS/EP… Create Contours… Triangulate Surface Model….*
2. Pulldown the name - for example *Tank Excavation*.
3. Pulldown to set boundary line to *Select*.
4. Place a checkmark by *Display Model* if you want to see a temporary set of triangulation. Place a checkmark by *Place Triangles* if you want to have triangulation objects placed into the drawing.
5. Click Apply.
6. Use AutoCAD selection methods to pick the excavation lines. Press Enter.
7. Select the outer line of the excavation.
8. Click Close on the Triangulate Surface Model.

Verifying the Tank Excavation Surface Model

1. From AutoCAD Click *NRCS/EP… Create Contours… Make Intermediate & Index….*
2. Verify the surface model name *Tank Excavation*
3. Usually no checkmarks are place in any of the boxes.
4. Click Apply. Contours will appear in CAD.
5. Click Close
6. Review the contours to determine whether the surface model is correct.
7. From AutoCAD Click *NRCS/EP… Create Contours…Track Coordinates….*
8. Verify the surface model name *Tank Excavation*
9. Click Apply
10. Move cursor around in CAD and elevations will be displayed.
11. Click Close
12. From AutoCAD Click *NRCS/EP… Create Contours… Erase Existing Objects….*
13. Checkmark *Contours* and any other items that have been placed into CAD. Click apply. Click Close

Computing the Excavation Volume

1. From AutoCAD Click *NRCS/EP… Volumes… Calculate Prismoidal….*
2. Pulldown original surface model to *Ognd*
3. Pulldown final surface model to *Tank Excavation*
4. Click apply. Click the **Printer Icon** to print.
5. When done Click Close.

Creating a Profile Reference Line in the Plan View

1) Set the current layer to *C.Plan.Alin*
2) Click **Polyline**
3) Shift Right-Click and Click *Quadrant*.
4) Click to a quadrant of the circular concrete tank.
5) Shift Right-Click and Click *Quadrant*.

6) Click to the opposite quadrant of the circular concrete tank.
7) Press Enter
8) Repeat 2 through 7 for a second alignment 90 degrees to the first one.
9) Click **Scale**
10) Select the profile alignment lines
11) Press Enter
12) Shift Right-Click and Click *Center*.
13) Click to the center of the tank circle.
14) Input a multiplying factor to increase the line length {2}.
15) Trim or Extend the profile alignment lines if desired.
16) If rotation of the alignments are needed, Click **rotate**.
    a) Select the profile alignment lines
    b) Press Enter
    c) Shift Right-Click and Click *Center*.
    d) Click to the center of the circle.
    e) Move your cursor to give the correct new rotation and click. Or input a rotation amount and press enter. (0 degrees is to the right, counterclockwise is positive.) E.g. {45} would rotate the lines 45 degrees counterclockwise.
17) From AutoCAD Click *View… Named Views… New…*
18) Input a view name. E.g. {Tank Plan View} Click OK. Click OK.

Creating the Reference Location for a Profile in the Drawing

1. From AutoCAD Click *NRCS/EP… Profiles/Sections…Setup Profile Coordinate System ….*
2. Click the **New Profile Coordinate System Icon**.
3. Input a Profile name. E.g. {Tank North to South}.
4. Click into the X box. Click the **Pick In CAD** button.
5. Select a location in the drawing that will not overlap a profile with the plan view part of the drawing.
6. Click into the Station box. Input a Stationing that you want to correspond to this reference location in the drawing. E.g. {0} Press Tab
7. Input an elevation that you want to correspond to this reference location in the drawing. E.g. {50} Press Tab
8. Click OK
9. Click Close.

Creating the Profile in the Drawing

1. From AutoCAD Click *View… Named Views…*
2. Highlight a view name. E.g. {Tank Plan View} Click Set Current. Click OK.
3. Decide the horizontal and vertical scales that you want for the profile view.
4. From AutoCAD Click *NRCS/EP… Plot Scale…*
5. Input the horizontal and vertical scales. E.g. Horz ={10}, Vert = {5}
6. Click OK.
7. Determine the Reference station of the starting end of the Profile alignment. E.g. {0}

8. From AutoCAD Click *NRCS/EP… Profiles/Sections…Profile from Surface Model ….*
9. Highlight the Surface Models that you want profiles of. *Ognd*, *Tank Excavation.*
10. Click OK.
11. Select a Profile alignment line.
12. Select the same line.
13. Click near the starting end of the line.
14. Input the beginning stationing of the line. E.g. {0} Click OK.
15. Locate the Profile view within the drawing and zoom in around it.
16. From AutoCAD Click *View… Named Views… New…*
17. Input a view name. E.g. {Tank profile N to S} Click OK. Click OK.
18. Select the Original Ground line and change the layer property to *C.Prof.Ognd*.
19. Select the Excavation line and change the layer property to *C.Prof.Exca*.

Placing a Tank Section into the Profiles

1. From AutoCAD Click *Insert… Block…Browse ….*
2. Browse to the desired tank based on correct wall height. {C:\My Projects\Symbols and Blocks\bConcTank100x8.dwg}. (All 4 tank depths are 100' diameter. The diameter will be increased or decreased later.) Highlight the filename. Click Open.
3. Checkmark *Insertion Point On Screen*
4. Uncheckmark *Scale On Screen*. Uncheckmark *Uniform Scale*.
5. X scale and Z scale = 1. Input Y scale value as the Horizontal plot scale divided by the Vertical plot scale as set up for this profile coordinate system. (10/5=2) {2}
6. Uncheckmark *Rotation Angle On Screen* {0}. Click OK.
7. Snap the block to the left edge of the subgrade excavation in the profile.
8. Click **Explode**
9. Select the tank block. Press Enter
10. Click **Stretch**
11. Crossing Window (Right to Left) around the right half of the tank and right cut slope. Use {r} to remove other objects from the selection.
12. Press Enter
13. Click anywhere.
14. Using the change in diameter relative to the 100' tank, input the amount to stretch the tank. E.g. {@-40,0} would reduce the tank to a 60' diameter. Press Enter

Placing a Grid on the Profiles

1. From AutoCAD Click *NRCS/EP… Profiles/Sections…Grid ….*
2. Check *Paper Units* and input the grid dimensions for the paper. E.g. For Grids that fill the full title block: (You can use less than the full height)
   For 11x17: Length={14}, Height={10}, Area Height ={.25}, Elev Width ={.5}.
   For 22x34: Length={28}, Height={20}, Area Height ={0.5}, Elev Width={1}.
3. If used for 11x17: click the **CAD settings icon** and change the Datum Elev and Stations Text size to {0.12}. and click apply for each one.
   For 22x34: Datum Elev={.24}, Stations={.24}.

4. Click OK.
5. Input desired Station Interval labeling. E.g. {10} and Input desired Datum Elevation Interval labeling. E.g. {5}. (Usually use the same as the Horizontal & Vertical Scales)
6. Click OK.
7. Click to place the outline of the Grid to enclose the Profile lines.
8. If Grid is not the right size or not placed correctly, select it and press Delete.

Select the grid then use AutoCAD *Tools… Display Order… Send to Back…* Turning off the 3.Grid.Fine layer can be helpful for viewing the profile in CAD.

Labeling Elevations on an Object in the Profile

1. From AutoCAD Click *NRCS/EP… Profiles/Sections…Annotate Point/Grade Break…*
2. Click *Point*, Checkmark *Leader* & *Smooth*.
3. Click in *Station*.
4. Click the **Pick In CAD icon**
5. Osnap to the top of tank wall.
6. Verify the Elevation Box
7. Click Apply
8. Click a first point slightly away from the snapped location.
9. Click a second point that is farther away from the snapped point.
10. Click a third point for the location of the text end of the line.
11. Press Enter
12. Click the location for the text.
13. Click Close

Drawing the Drainfill Objects with Uneven Elevations

1. Review the Profiles and decide a planned elevation of the top of drain at each quadrant of the tank.
2. From AutoCAD Click *View… Named Views… New…*
3. Highlight the plan view name. E.g. {*Tank Plan View*} Click Set Current.
4. Click OK.
5. Set the current layer to *W.Plan.Drai*
6. Right-Click on Osnaps. Click Settings
7. Checkmark *Center* & *Intersection* & *Object Snap On*.
8. Click OK.
9. Click **Arc**
10. Input {C} for Center. Press Enter
11. Snap to the center snap of the circular concrete tank.
12. Snap to the intersection of an alignment line and the outer diameter of the tank.
13. Snap the next counter clockwise intersection of an alignment line at the outer diameter of the tank.
14. Repeat steps 9 to 13 for the remaining 3 quadrants of the circle.

Apply the correct top of drain elevations to the arcs.

15. From AutoCAD Click *NRCS/EP… Create Site Layout… Interpolate Additional Geometry….*
16. Input the correct elevation for the top of drainfill at one end of the first arc. E.g. {52}
17. Press tab.
18. Input the correct elevation for the top of drainfill at the other end of the arc. E.g. {54}
19. Press tab.
20. Uncheck *Make copy of object…*
21. Click *Settings*
22. Press Tab
23. Input {5} for minimum length of segments. Press Tab
24. Input {5} for maximum length of segments. Press Tab
25. Click Ok
26. Click Apply
27. Select the drainfill arc near the "starting endpoint" elevation that you want applied.
28. Repeat steps 15 to 27 for the remaining 3 arcs. Make sure that the end point elevations of the adjacent quadrants are equal.
29. Click Close
30. From AutoCAD Click *NRCS/EP… Create Site Layout… 3D Join….*
31. Select 4 quadrants of the drainfill lines. Press Enter.
32. Select the toe to see if has all become one 3D Polyline. If not ends grips may need to be re-snapped to ends of adjoining lines.

Placing the Toes of the Drainfill

1. From AutoCAD Click *NRCS/EP… Create Site Layout… Project Slopes to Surface Model….*
2. Pulldown to the tank excavation surface model name. E.g {Tank Excavation}
3. Input the fill slope to be nearly level. E.g. {-0.01} as %S.
4. Uncheckmark *Erase all Existing Slope Projections…*
5. Click Apply
6. Select the drainfill line.
7. Click on the outside of the drainfill line.
8. Press Enter. Click Close
9. Select all of the slope projection lines and change their layer property to *W.Topo.Drai.Slop*.
10. Select all of the lines that represent the edges of drainfill slope. Right Click.
11. Click *Properties* . Pulldown the layer to *W.Plan.Drai*
12. Press Esc.

Preparing Surface Model settings for the Tank Excavation

1. From AutoCAD Click *NRCS/EP… Create Contours… Manage Surface Model….*
2. Click the **New Surface Model Icon**. This brings up New Surface Model box.
3. Click on the **Library icon** (looks like books on a shelf) and select the *Drainfill* surface model. Click Load Prototype. Click Yes. Click Close.
4. Input a Description name. E.g { Drainfill }, which would represent the top of the drainfill around the tank.
5. Once you have settings done Click OK.
6. Click Close to close out Manage Surface Models

Creating a Surface model for the Drainfill

1. From AutoCAD Click *NRCS/EP… Create Contours…Triangulate Surface Model….*
2. Pulldown the name - for example *Drainfill*.
3. Pulldown to set boundary line to *Select*.
4. Pulldown to set Void Regions to *Select*.
5. Place a checkmark by *Display Model* if you want to see a temporary set of triangulation. Place a checkmark by *Place Triangles* if you want to have triangulation objects placed into the drawing.
6. Click Apply.
7. Use AutoCAD selection methods to pick the inner and outer edge of drainfill lines. Press enter.
8. Select the outer catchline of the drainfill.
9. Select the inner line of the drainfill. Press Enter.
10. Click Close on the Triangulate Surface Model.

Verifying the Drainfill Surface Model

1. From AutoCAD Click *NRCS/EP… Create Contours…Track Coordinates….*
2. Verify the surface model name *Drainfill*
3. Click Apply
4. Move cursor around in CAD and elevations will be displayed.
5. Click Close

6. From AutoCAD Click *NRCS/EP… Volumes…Track Depths….*
7. Pulldown the Original surface model name *Tank Excavation*
8. Pulldown the Final surface model name *Drainfill*
9. Click Apply
10. Move cursor around in CAD and elevations will be displayed.
11. Click Close

Computing the Drainfill Volume

1. From AutoCAD Click *NRCS/EP… Volumes… Calculate Prismoidal….*
2. Pulldown Original surface model to *Tank Excavation*
3. Pulldown Final surface model to *Drainfill*
4. Click apply. Click the **Printer Icon** to print.
5. Click Close. Click Close

Plotting the Profiles in Paperspace

1. Refer to the EP/ACAD How to: Profiles instructions for Plotting a Profile in Paperspace and Setting Fine Gridlines to Grayscale.

Eagle Point Steps

Notation Method
Button to Press *Displayed Text* **Icon** Action {Text to Enter} *Menu Item…*

Things to do First

1. Create an Eagle Point project that contains the original ground surface and a subsurface for the stripping.
2. Open the Eagle Point project that has the original ground surface to use, and have only one dwg file open.
3. In AutoCAD click on *Tools… Options…System…* .
4. Checkmark *Single drawing compatibility mode*. Click OK.

Starting a RoadCalc Sub-Project Using an NRCS Prototype

1. At the EP Main Menu click on *File… New….*
2. Click **Create New Project Icon** located in lower left-hand corner.
3. Highlight *Road Calc Sub Project* and click Next.
4. Make sure that the correct main project name is highlighted in the top box.
5. Input a project description. E.g. {Dam On Road}
6. At the prototype setting pull down to select *NRCS 11x17* or *NRCS 22x34*.
7. Click Next
8. Highlight the main project drawing and click Finish.
9. At the Open Project box highlight the Road Calc project.
10. Click OK.
11. Click on EP Main Menu *Tools…Plot Scales…*
12. Input the horizontal scale that you will use in a plan & profile sheet. Example 1" = {100} feet. Press Tab.
13. Input the vertical scale that you will use in a plan & profile sheet. Example 1" = {5} feet. Press Tab.
14. Click OK.
15. Click on EP Main Menu *System…Embedded CAD Menus…* so that a checkmark shows and EP is placed into the CAD menu.
16. Click on *EP…Road Calc…* so that the Road Calc menus are placed into the CAD menu.

Remember: **You can minimize the Eagle Point & Road Calc menu but you should NOT close out the EP main menu.**

Place an object for the centerline & convert it to the alignment

1) From CAD Click **Polyline**
2) Draw a line that represents the centerline of the dam.
3) Click *Alignments… Convert Object to Alignment…*
4) Click on the line that represents the centerline.
5) Click a point near the left end of the dam as the beginning.

6) Pulldown Alignment as *Centerline*.
7) **If** the beginning stationing of the centerline is know:
   A) Input a Beginning stationing of the alignment. E.g. {0}
   B) Click Apply.
8) Or, **If** a reference point or baseline exists along the centerline with a known stationing:
   A) Click Station Data…
   B) Click Reference Station…
   C) Click in Northing
   D) Click the **Pick In CAD** button.
   E) Snap to the intersection of the centerline & the known baseline reference point.
   F) Input the Station value of the baseline E.g. {350}
   G) Click OK
   H) Note that the Beginning Station value appears in the box. If this looks realistic Click OK
   I) Click Apply.
9) Click *Alignments… Edit Alignment Data…*
10) Pulldown Alignment as *Centerline*.
11) Review the alignment points & coordinates.
   A) Double click any PI to edit the data. Click OK for changes to take affect. The alignment line in CAD is updated to the new coordinates.
      i) Click Curve Data… to input the length of a horizontal curve. Input the length in the L row and press tab to have it take affect. Click Close.
   B) Click Close.

Create an Existing Ground Profile

1) Click *Profiles… Extract from Surface Model…*
2) Pulldown Profile Name as *Ognd*.
3) Pulldown the original ground name for Surface Model. E.g. *Ognd*.
4) Click OK.
5) Select the centerline alignment object.
6) Click Save Changes as Yes.
7) Click **Zoom Extents** to see the profile of the Orginal Ground extracted from the surface model.

Create the Design Profiles (Centerline & Berm)

1) Click **Polyline**.
2) Draw lines in the profile view which represent the profile of the top of dam and of the wave berm. Do not worry about the correctness of these lines yet. Just get the general location of them. An on-road dam might have an left end profile that matches the existing road slope, a middle level grade, and a right end profile that matches the existing road slope.

3) Click *Profiles… Convert Objects to Profile…*
4) Select the line for the top of dam.
5) Press Enter
6) Click Next
7) Pulldown to *Centerline*
8) Click Finish. The top of dam line becomes red.
9) Click *Profiles… Edit Data…*
10) Pulldown to *Centerline*
11) Double Click to edit the VPI.
12) Change the stations to "even" amounts. Input the correct elevations for the VPIs.
13) Click Apply.
14) Click Close
15) Double Click to edit the next VPI.
16) Change the stations to "even" amounts. Input the correct elevations for the VPIs.
17) Click Apply.
18) Click Close
19) Repeat as needed.
20) Click Curve Data… to input the length of a vertical curve in the L line. Press tab for the change to apply. Use the **Right Arrow icon** to move to the next VPI. Observe the begin curve and end curve stations of the current, previous and next columns to make sure that the vertical curves do not overlap. Click Close.
21) Click Close.

22) Click *Profiles… Manage…*
23) Click **New Profile**
24) Input a name for the profile. E.g {Wave Berm only}Press Tab
25) Click OK.
26) Click Close.
27) Click *Profiles… Convert Objects to Profile…*
28) Select the line for the wave berm.
29) Press Enter
30) Click Next
31) Pulldown to *Wave Berm only*
32) Click Finish. The wave berm line changes color.
33) From the RoadCalc Menu click *Profiles… Edit Data…*
34) Pulldown to *Wave Berm only*
35) Double Click to edit the VPI.
36) Change the stations to "even" amounts. Input the correct elevations for the VPIs.
37) Click Apply.
38) Click Close
39) Double Click to edit the next VPI.
40) Change the stations to "even" amounts. Input the correct elevations for the VPIs. (This is for the downstream edge of the wave berm.)
41) Click Apply.
42) Click Close

43) Repeat 39 to 42 as needed.
44) Click Close

Define the names of the RoadCalc surfaces

1) Click *Cross Sections… Manage Surfaces…*
2) The NRCS prototype already has some surface names pre-named. Original surface names for Original Ground and Subsurface (stripping) and a design surface for Dam are already there. You could add a stream channel cleanout that was created in your EP project using Site Design. Click New, Input a name {SCCO}, pulldown *Type* to *Absolute*. Click OK.
3) Click Close

Cut cross sections from the Original Ground & Subsurface TIN

1) Click *Cross Sections… Extract Cross Sections…*
2) Checkmark *Stationing Interval* and Input the spacing of the cross sections that you want to use for toes. You can choose specific cross sections to plot later. E.g. {10}
3) Checkmark *Mark Stations for Extraction*
45) Click OK.
4) Checkmark surfaces to extract for *Ognd* & *Subsurf*.
5) Pulldown the Surface Model name to the correct surface model that exists in the EP project. *Ognd => Original Ground, Subsurf=> Stripping*
6) Input left corridor edge as a negative. E.g {-250}
7) Input right corridor edge as a positive. E.g {250}
8) The stationing list shows the locations marked to have sections created.
9) To add an additional station such as at the centerline of the pipe, Click New Station, Input the stationing E.g. {525}. Click OK.
10) When ready to have sections created Click OK.
11) From the RoadCalc Menu click *Cross Sections… Edit Cross Section Data…*
12) To graphically view the sections Click the Query Cross Section icon. (Right of the binoculars)
13) Review the cross section by clicking the right arrow icon.
14) Review the next section by click the View Next Cross Section icon (has a + symbol)
15) When done Click Close
16) To view the data highlight the station in the upper part of the screen and view the data in the lower half.
17) Click Close

Create the Simple Typical Section for your Top Width

1) Click *Typical Sections… Manage Typical Sections …*
2) Click **New Typical Section**
3) Input a name the simple top width configuration. E.g {26TW 0.6 crown} Press Tab.
4) Input an extra description needed. E.g {26 foot top width. Centerline is crowned 0.6 higher than the shoulders}

5) Click OK
6) Click Close
7) Click *Typical Sections… Construct Typical Sections …*
8) Pulldown to *26TW 0.6 Crown.*
9) Click **View Typical Section Graphic**. (Binoculars)
10) Click for save Yes.
11) Click **Precision Input** (Micrometer)
12) Input {A} for Absolute coordinate entry. Press Enter
13) Input {0} Press Enter (X coordinate)
14) Input {0} Press Enter (Y coordinate)
15) Input {1} Press Enter (PT code of 1 for centerline)
16) Input {XY} for Change in X & Y values entry method. Press Enter
17) Input {26} Press Enter (change in X value)
18) Input {-.6} Press Enter (change in Y value)
19) Input {9} Press Enter (PT code of 9 for Edge of Road)
20) When right side of typical section looks correct click Mirror Right to Left.
21) Click Define Typical Section
22) Click OK
23) Click Close

Create the condition (outside slopes) to be used

1) From the RoadCalc Menu click *Process… Manage Condition Tables …*
2) Click New Condition Table.
3) Input a name describing the use. E.g. {Normal 3 to 1 cut & fill}
4) Highlight Cut.
   A) To edit Double Click the condition factors and make changes. Click OK
5) Highlight Fill and repeat.
6) Click Close

Specify the Typical Section & Condition (Outside Slopes)

1) Click *Process… Edit Design Locations …*
2) In the upper half of the screen, click New Typical Section Location.
3) Input the station that you want to start building earthwork at. {50}
4) Pulldown the correct typical section: {26TW 0.6 Crown}
5) Click OK
6) In the lower half of the screen, click New Condition Table Location.
7) Input the station that you want to start building the earthworks. {50}
8) Pulldown the correct left condition table: {Normal 3 to 1 cut & fill}
9) Pulldown the correct right condition table: {Normal 3 to 1 cut & fill}
10) Click OK
11) Click Close

Run the Prelimary Design & View the Sections

1) Click *Process… Run Design …*
2) Pulldown Method to Step Through All
3) Click Run
4) Click View Next Cross Section to scroll through the sections
5) Click Close

Extract Downstream Toes as a Preliminary Estimate for Road Ditch Profile

1) Click *Output… Profiles from PT Codes …*
2) Checkmark Extract for PT Code *1000* (left) and Pulldown surface as *Des_Dam*.
3) Click OK.

This new line is helpful for determining the planned profile for the downstream road ditch. Convert this object to a defined profile for the downstream road ditch.

4) Click *Profiles… Manage…*
5) Click **New Profile**
6) Input a name for the profile. E.g {Downstream Road Ditch}Press Tab
7) Click OK.
8) Click Close.
9) Click *Profiles… Convert Objects to Profile…*
10) Select the line for the Downstream Road Ditch.
11) Press Enter
12) Click Next
13) Pulldown to *Downstream Road Ditch*
14) Click Finish. The line changes color.
15) Click *Profiles… Edit Data…*
16) Pulldown to *Downstream Road Ditch*
17) Click Raise/Lower Profile.
18) Input the approximate depth of ditch that you want to have. E.g {-2.5}.
19) Click OK.
20) Click Close
21) Click **Polyline**. Visually use this profile to draw a final downstream ditch profile. Keep the ditch profile above original ground where no downstream ditch is wanted.
22) Click *Profiles… Convert Objects to Profile…*
23) Select the new "final" line for the Downstream Road Ditch.
24) Press Enter
25) Click Next
26) Pulldown to *Downstream Road Ditch*
27) Click Finish. The line changes color.
28) Click *Profiles… Edit Data…*
29) Pulldown to *Downstream Road Ditch*
30) Click OK.

31) Double Click to edit the next VPI.
32) Change the stations to "even" amounts. Input the correct elevations for the VPIs.
33) Click Apply.
34) Click Close
35) Repeat editing the VPIs as needed.
36) Click Close

Extract Upstream Toes as a Preliminary Estimate
for Road Ditch & Wave Berm Profile

1) Click *Output… Profiles from PT Codes …*
2) Checkmark Extract for PT Code *1001* (right) and Pulldown surface as *Des_Dam*.
3) Click OK.

This new line is helpful for determining the planned profile for the upstream road ditch.

4) Click *Profiles… Manage…*
5) Click **New Profile**
6) Input a name for the profile. E.g {Upstream Ditch & Berm}Press Tab
7) Click OK.
8) Click Close.
9) Click *Profiles… Convert Objects to Profile…*
10) Select the line for the Upstream Road Ditch.
11) Press Enter
12) Click Next
13) Pulldown to *Upstream Ditch & Berm*
14) Click Finish. The line changes color.
15) Click *Profiles… Edit Data…*
16) Pulldown to *Upstream Ditch & Berm*
17) Click Raise/Lower Profile.
18) Input the approximate depth of ditch that you want to have. E.g {-2.5}.
19) Click OK.
20) Click Close

21) Click **Polyline**. Visually use this profile to draw a final upstream ditch/wave berm profile.
22) Click *Profiles… Convert Objects to Profile…*
23) Select the line for the Upstream Ditch/Wave Berm.
24) Press Enter
25) Click Next
26) Pulldown to *Upstream Ditch & Berm*
27) Click Finish. The line changes color.
28) Click *Profiles… Edit Data…*
29) Pulldown to *Upstream Ditch & Berm*
30) Double Click to edit the next VPI.
31) Change the stations to "even" amounts. Input the correct elevations for the VPIs.

32) Click Apply.
33) Click Close
34) Repeat editing the VPIs as needed.
35) Print out the profile data.
36) Click Close

Create the Typical Section for the Embankment with Wave Berm

1) Click *Typical Sections… Manage Typical Sections …*
2) Highlight the simple dam section *26TW 0.6 Crown*
3) Click **Copy Typical Section**
4) Input a name for the dam with berm. E.g {26TW Road & 20 Wave} Press Tab.
5) Input an extra description needed. E.g { 26' TW Road with 0.6 Crown, 3:1 slope down to 20' sloping wave berm on 10:1 }
6) Click OK
7) Click Close
8) Click *Typical Sections… Construct Typical Sections …*
9) Pulldown to *26TW Road & 20 Wave*.
10) Click **View Typical Section Graphic**. (Binoculars)
11) Click for save Yes.
12) Click **Cut and Fill Detail**
13) Click **Precision Input** (Micrometer)
14) Input {A} for Absolute coordinate entry. Press Enter
15) Input {26} Press Enter (X coordinate)
16) Input {-.6} Press Enter (Y coordinate)
17) Input {0} Press Enter (a PT code already exists at this location)
18) Input {XH} for Change in X & H slope values entry method. Press Enter
19) Input {6} Press Enter (change in X value)
20) Input {-3} Press Enter (H/V ratio)
21) Input {3} Press Enter (PT code of 3 for Toe of Foreslope – downstream edge of berm)
22) Input {XH} for Change in X & H slope values entry method. Press Enter
23) Input {20} Press Enter (change in X value)
24) Input {-10} Press Enter (H/V ratio)
25) Input {4} Press Enter (PT code of 4 for Toe of Cutslope – upstream edge of berm)
26) Click Define Typical Section
27) Click OK
28) Click Close

Create the Typical Sections for the Embankment
with Upstream Road Ditch

1) Click *Typical Sections… Manage Typical Sections …*
2) Highlight the dam section *26TW Road & 20 Wave*
3) Click **Copy Typical Section**

1) Input a name for the simple dam with an upstream road ditch. E.g {26TW 12' US Ditch} Press Tab.
2) Input an extra description needed. E.g { 26foot topwidth, 3:1 slope to 12' BW upstream ditch}
3) Click OK
4) Click Close
5) Click *Typical Sections… Construct Typical Sections …*
6) Pulldown to *26TW 12' US Ditch.*
7) Click **View Typical Section Graphic**. (Binoculars)
8) Click for save Yes.
9) Select the line that goes between PT 3 & 4
10) Modify Properties so that the line is 12' long and level.
11) Move the PT 4 symbol to the new end of the line.
12) Click Define Typical Section
13) Click OK
14) Click Close

Associate Special Profiles (wave berm, etc)

1) Click *Process… Associate Alignment and Special Profiles …*
4) Click **New PT Code Association**
2) Pulldown PT Code to *3.*
3) Click *Right*
4) Pulldown Alignment to *None*
5) Pulldown Profile to *Upstream Ditch & Berm*
6) Pulldown Control Type to *Slope*
7) Pulldown Control PT Code to *3*
8) Click OK.
9) Click Close

For Each Reach Specify the Typical Section & Condition (Outside Slopes) to be used

1) Click *Process… Edit Design Locations …*
2) In the upper half of the screen, click **Modify Typical Section Location**.
3) Pulldown the correct Typical section: {*26TW 12' US Ditch*}
4) Pulldown Transition Type as: {*Do not transition*}
5) Click OK
6) In the upper half of the screen, click **New Typical Section Location**.
7) Input the station that you want to switch to the wave berm. Refer to the profile data printout. {100}
8) Pulldown the typical section for the wave berm: {*26TW Road & 20 Wave*}
9) Click OK
10) In the upper half of the screen, click **New Typical Section Location**.
11) Input the station that you want to switch back to the rod ditch. Refer to the profile data printout. {560}

12) Pulldown the typical section for the road ditch: {*26TW 12' US Ditch* }
13) Click OK
14) Click Close

Run the Prelimary Design & View the Sections

1) Click *Process… Run Design …*
2) Pulldown Method to *Step Through All*
3) Click Run
4) Click *View Next Cross Section* to scroll through the sections
5) Review the sections and determine if any profile or stationing changes are needed.
6) Click Close

Create Surface Model from Road

1) Click *Output… Printouts: Create Surface Model from Road …*
2) Click **Mange Surface Models**
3) Click the **New Surface Model Icon**. This brings up New Surface Model box.
4) Click on the **Library icon** (looks like books on a shelf) and select the *Embankment* surface model. Click Load Prototype. Click Yes. Click Close.
5) Input a Description name. E.g {Embk}, which would represent embankment.
6) Once you have settings done Click OK.
7) Click Close to close out Manage Surface Models.
8) Pulldown Road Surface Model to *Embk*
9) Click OK.

Review & Print Volumes

For Cross Sectional Volume Calculations
1) Click *Output… Printouts: Volumes …*
2) Click **Print**
3) Click Close

For Prismoidal Calculations use *Site Design… Volumes… Prismoidal…*

Develop Xsection sheets

1) Click *Output… Graphics: Cross Section Sheets …*
2) Click Stations to Plot
3) Pulldown Format to *Sheet settings*.
4) Click Edit
5) Make changes to the Scales, # of Columns, etc Click Ok
6) Highlight Stations to plot or not plot and Click mark on or mark off.
7) Click Ok
8) Click **New Cross Section Sheets**
9) Click Ok

10) Highlight the Sheet Number that you want to view.
11) Click **View Cross Section Sheets** (Binoculars)

Develop Plan/Profile sheet

1) Click *Output… Graphics: Breaklines from PT codes …*
2) Checkmark PT codes 9, 3, 4, 1000, and 1001, Pulldown surface to *Des_Dam*
3) Click OK
4) Select lines and move them to the correct layers. {C.Plan.Embk}

5) Click *Output… Graphics: Plan & Profile Sheets …*
6) Pulldown Format to *Sheet settings*.
7) Click Edit
8) Make changes to the Grid Spacings. Click Ok
9) Pulldown Format to *Station/Elevation Intervals*.
10) Click Edit
11) Make changes to the Stationing Offset & Intervals. Click Ok
12) Click **New Plan & Profile Sheets**
13) Click Ok
14) Click **View Cross Section Sheets** (Binoculars)

15) Click *Output… Graphics: Adjust Plan & Profile Sheets …*
16) Click the black arrows to shift the sheet to line up the profile & plan better.